A qualitative approach to assessing the pedestrian environment

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Abstract

European cities have always been attentive to the needs of pedestrians, and walking has traditionally been the prevailing means of transport. However, during the last century, car driving has been granted increasing priority in investment programs, and the rising urban car dependency has negatively affected pedestrians quality needs (PQN). Because of these problems, European cities will have to differently approach car-oriented policies, aiming at a more sustainable design and transport planning, as well as an effective mobility management. Generally, countries appear to be on the right path, and there are several examples of pedestrian-friendly cities. However, more needs to be done and in the European context there are too many disparities between countries performing at different levels.

This article presents the PQN matrix, a qualitative approach to assessing pedestrian environment, which translated pedestrians' quality needs into five basic requirements: connectivity, conspicuity[1], comfort, convenience and conviviality. This framework only takes into account the connection between pedestrians' needs and the environment, whilst neglecting the other three components of the system, i.e. person, vehicle and organisation. A practical application is also provided, through the analysis of twenty pedestrian-friendly cities in the countries taking part in COST Action 358. This analysis aims at developing a comprehensive comparison among these cities, stressing their differences and similarities.

This article is based on the key findings achieved by the Short-Term Scientific Mission (STSM) that took place in February and March 2008 at AVV Transport Research Centre DVS in Rotterdam (The Netherlands)[2].

[1] The quality of being *conspicuous*; obviousness (www.thefreedictionary.com/conspicuity)
[2] AVV Transport Research Centre is currently named Rijkswaterstaat Centre for Transport and Navigation and is now based in Delft.

Brief biography of the author

Giulia Dell'Asin is graduated in Civil Engineering – Transportation (Politecnico di Torino) since 2008. She joined TRANSyT/UPM in July 2009, where she is working as a researcher in the field of transport modelling and optimization, and carrying out her PhD tesis. She is involved in the European project HERMES VII FP on "passenger long-/short distance intermodality".

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1. Introduction

Walking seems to have declined over the past decades as a means of transport, and it has turned into an increasingly difficult activity for specific categories of users, such as people with limited mobility, the elderly and children (Methorst, 2005). Recently, several efforts have been made in Europe, to prioritize walking in urban areas and to develop new mobility schemes, oriented to vulnerable road users, as an alternative to past policy measures that favoured car use. As regards safety issues, the objective of the European countries is to strongly reduce pedestrian fatalities by 2010 (European Commission, 2001).

However, pedestrian environment and the cities' *walkability*[4] cannot successfully be improved if policy makers do not include pedestrians in transport planning and urban development. Moreover, walkability has to be related to the need for **quality**, a rather neglected issue in the pedestrian system. The concept of quality and its assessment has been recently been taken into account in other sectors, e.g. public transportation (UNE-EN 13816, 2003), but up till now little has been done to produce a more comprehensive approach inclusive of pedestrian quality needs and their satisfaction as "customers of the pedestrian system".

Finally, among the issues pertaining to pedestrians, technical (engineering) interventions are not sufficient to provide adequate levels of quality: policy measures also need to consider other sectors and disciplines, such as sociology, psychology, ergonomics, technology and transportation. As a matter of fact, reference to the carrying out of a comprehensive analysis of the pedestrian system takes the name of Pizza Model (Methorst, 2003), a visual checklist that summarises the four components of the pedestrian system: *person, vehicle, organisation* and *environment* (Figure 1).

The STSM was confined to one slice of the model, namely the "environment" dimension, and this article improves the knowledge on pedestrians' quality needs with regard to the spatial environment. Consequently, the assessment framework provided by the PQN matrix only focuses on one part of the pedestrian system, thus there is need for further integration and completion of the template.

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[3] This article is the result of research conducted within the COST Action 358 as part of a Short-Term Scientific Mission carried out in cooperation with the Politecnico of Torino, Italy, which the author was associated with at the time of the study.

[4] Walkability is the quality of walking conditions, including factors such as the existence of walking facilities and the degree of walking safety, comfort and convenience (Litman, 2003). Walkability has health, environmental, and economic benefits: it is an important concept within sustainable transport policy. However, walkability is difficult to evaluate and quantify, because of the several and subjective factors that influence it, such as the built environment, traffic and road conditions, land use patterns, human perception, and social behaviour.

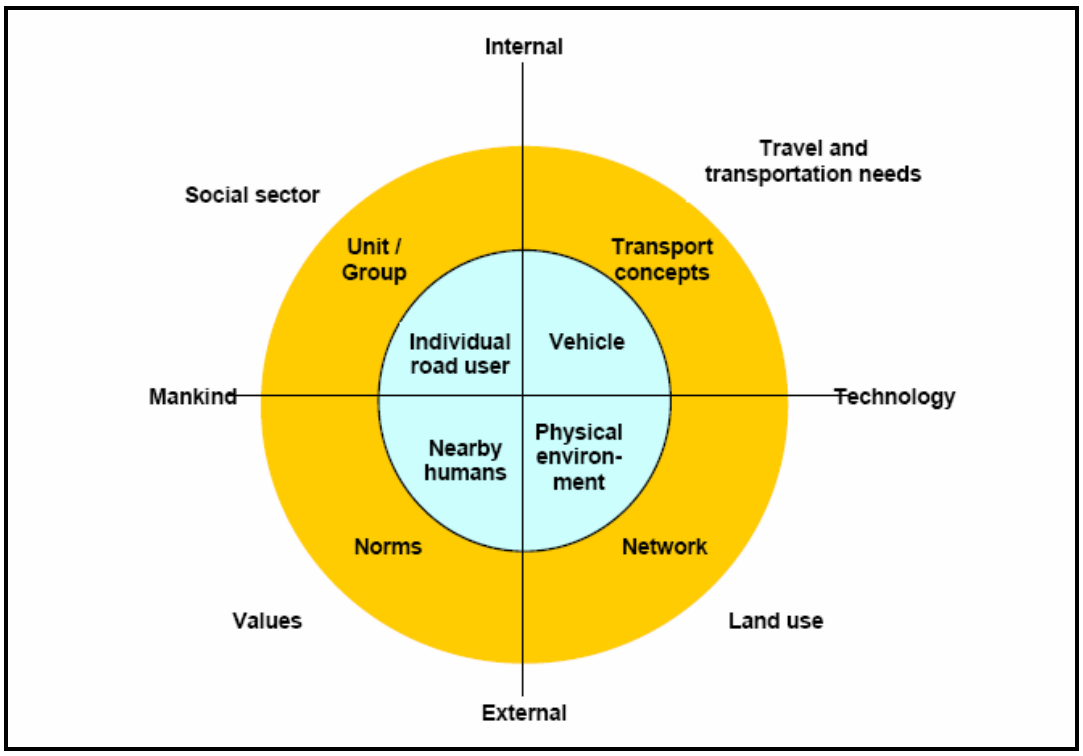


Figure 1 **Pizza Model**
Source: Methorst (2003)

2. The qualitative framework and PQN matrix

The qualitative template to assessing the pedestrian system and its level of quality is summarised in Figure 2 and is based on three aspects: context, pedestrians' quality needs and interventions. *Pedestrians' quality needs* are translated in five basic requirements that need to be satisfied in order to ensure the walkability of a specific area. The '5C layout' reflects pedestrians' desire to make their journeys in the shortest and most convenient way possible, as a safe, pleasant and comfortable journey experience. However, conditions for pedestrians vary widely from city to city and the *context* issue influences pedestrians' needs. Differences as far as climate, spatial conditions, quantity and composition of traffic are concerned set the need for different quality requirements and, consequently, for different *interventions and solutions*.

Therefore, in order to develop an effective qualitative framework, it is necessary to *a priori* define a series of issues of relevance to the analysis, i.e. definitions of PQNs, interventions and context items. As regards these classifications, they have been elaborated after reviewing examples mentioned in the literature, previous studies and relevant projects on the topic (ADONIS, 1998; WALCYNG, 1999; PROMPT, 2000; COST C6, 2002; Methorst, 2003).

Finally, it needs to be stressed that the work of this article develops a qualitative approach to assessing the pedestrian environment, neglecting the possibility to perform a quantitative analysis. The PQN matrix is a qualitative assessment tool and has to be considered as a template designed for data screening, pedestrian audit, walkability checklists, factorial analyses, etc.

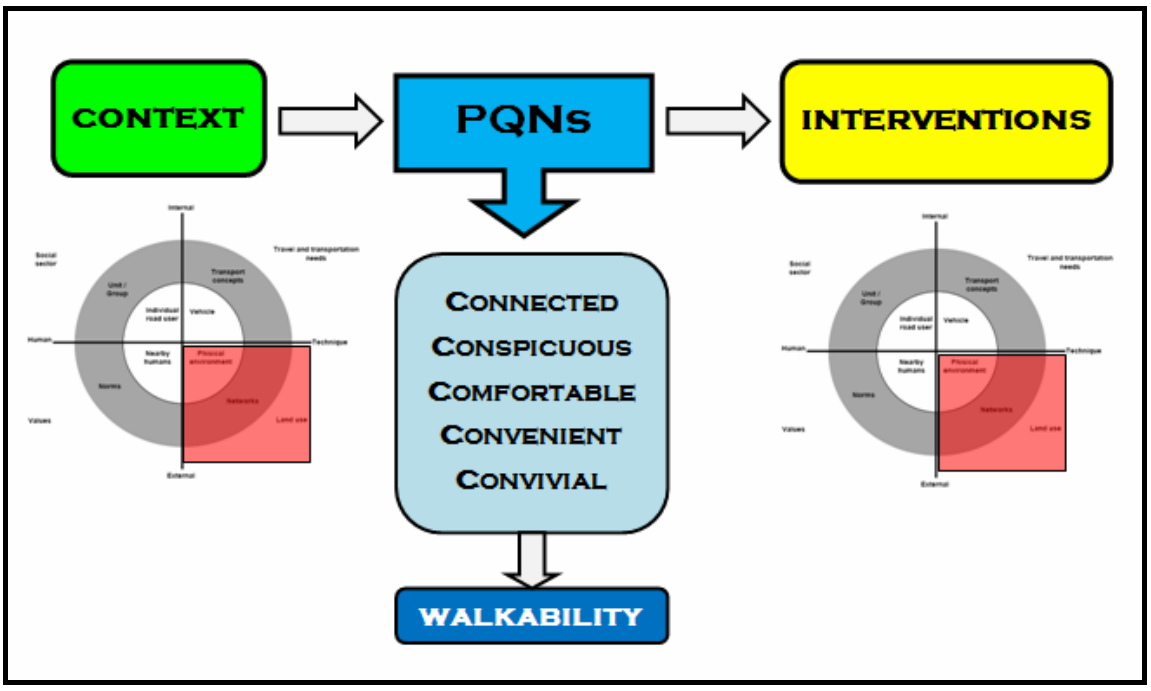


Figure 2 **Pedestrian qualitative assessment framework**
Source: own work

2.1. The 5C layout

Almost the entire world population happens to be a pedestrian at some time or the other. The term 'pedestrian' encompasses a wide range of people and, consequently, the determination of quality needs is ambiguous and human perception and experience play an important role.
From the literature, it appears that a large number of theories and classifications have been developed with regard to needs (such as Maslov, 1943; Alderfer, 1969; Van Hagen, 2006). This work identifies five factors, so that the analysis is founded on the *5Cs layout*, frequently used to classify and prioritise pedestrians' needs (Transport for London, 2005).

Therefore, pedestrians' needs are considered relative to the "5Cs", meaning that walking networks and facilities should be connected, convivial, conspicuous, comfortable and convenient. This layout is in accordance with the concept of walkability since, as stated by Risser (2003), *quality* for pedestrians is subjective and depends on the options for choices, the ease of the realisation process and possibly the comfort and pleasure derived from, on the one hand, the activities, and on the other, all social, economical, political and environmental factors and the perception of these conditions.

The five "Cs" are here defined in succession:

CONNECTED

The extent to which the pedestrian network links to key trip origins and destinations, as well as the extent of linkages between different routes on the network.

Features

- Undisturbed route between origin and destinations (yes/no).
- Absence of obstacles and obstructions.
- Access to public transport nodes (bus stops, railway stations).

CONVIVIAL

The extent to which walking is a pleasant activity, in terms of interaction with people, the built and natural environment, and other road users.

Features

- Absence of conflicts with other means of transportations (car, bicycle, moped, segway) and absence of threats and assaults.
- Absence of rubbish, potholes, roots, damaged surfaces.
- Adequate street furniture, benches, “places to stop”.

CONSPICUOUS

The extent to which walking routes and public spaces feel safe and inviting for pedestrians, in terms of clear and legible signing and information.

Features

- Lighting and visibility.
- Delineation and legibility.
- Traffic signs: information and orientation.

COMFORTABLE

The extent to which walking is accommodated to competences and abilities of all types of pedestrians.

Features

- Well maintained footpaths of adequate widths, smooth surface and with few obstacles (steps, mud, etc).
- Attractive landscape design and architecture, and provision of rest places opportunities.
- Absence of noise and fumes from motor traffic.

CONVENIENT

The extent to which walking is possible and able to compete with other modes of transport in terms of efficiency (time, money and space).

Features

- Road crossing opportunities: location, type, waiting time.
- Walkable distances between key destination and directness.
- Absence of barriers, changing level (steps and slopes) and discomfort.

2.2. The physical context

Pedestrians have to face with a physical environment that is strongly affected by the nature and geography of the territory - that is, internal properties -, but also by the built environment and the urban and transport planning - external characteristics.

After a literature review regarding context features related to pedestrians (Lynch, 1960; Buchanan, 1963; Cervero & Kockelman, 1997; USEPA, 2001; Ewing et al, 2006), the following items have been identified, since they recall the 3-layers approach of the Pizza Model. More insight is given in the final report of the PQN Project (COST 358, 2010).

Item 1 : Site

⇨ Buildings

⇨ Road intersections

⇨ Architectonical and historical buildings

Item 2: Network

⇨ Road network characteristics

⇨ Topography

⇨ Presence of barriers, e.g., streams / rivers / etc

Item 3: Space

⇨ Climate conditions

⇨ Urban design

⇨ Distribution of commercial activities, residential zones and essential destinations

2.3. Interventions and measures

Focusing on the "spatial environment" slice of the Pizza Model, interventions and measures are important for the improvement of the overall urban quality of the space in which pedestrians move, and they can be classified according to different criteria[5]. On the basis of a large review of literature projects and research (Dykstra et al, 1998; Biddulph, 2001; Olof Gunnarsson, 2001; PROMISING, 2001; COST C6, 2002; Transportation Research Board, 2003), the analysis is based on the scale classification, in order to make it compliant to the 3-layers of the Pizza Model. More insight is given in the final report of the PQN Project (COST 358, 2010).

Item 1 Site

⇨ *Crossings Interventions*
Example: provide adequate waiting time, crossing times, traffic calming measures, etc.

⇨ *Public Transport Waiting Areas Interventions*
Example: provide adequate space (platform), dropped kerbs, ramps, lighting, etc.

Item 2 Network

⇨ *Links Interventions*
Example: provide footpaths with proper width and gradient, street furniture, information, etc.

⇨ *Routes Interventions*
Example: create an attractive walking environment; provide pedestrian bridges, overpasses, etc.

Item 3 Space

⇨ *Public Spaces (rest areas, meeting places, squares) Interventions*
Example: prevent barriers; provide green areas, reduce noise and emissions levels, etc.

⇨ *Special Zones (school, residential areas,…) Interventions*
Example: Provide traffic calming measures in school zones, plan Home zones, etc.

2.4. The PQN matrix

The PQN matrix (Figure 3) provides a qualitative assessment of the pedestrian environment, focusing only on the "spatial environment" slice of the Pizza Model.

[5] There are different criteria to classify interventions, as below:
a) *Stage*: national, regional, provincial, municipal.
b) *Scale*: urban, street, site.
c) *Type*: technical, non technical.

Based on the qualitative framework presented in the previous sub-sections, the PQN matrix can be easily developed, since it is basically a picture checklist that connects quality needs (columns) and physical measures (rows).

Context items are not included in the matrix, but are important to explain these connections and point out at differences and similarities between different case studies, when a comparison analysis is carried out.

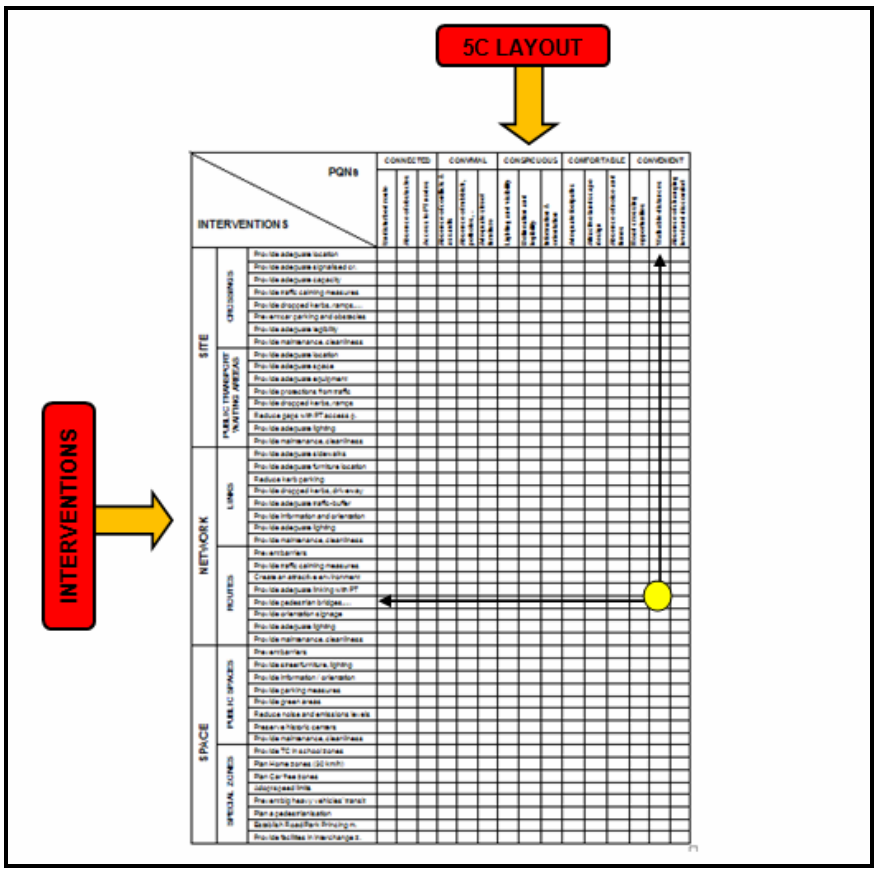


Figure 3 **PQN Matrix**
Source: own work

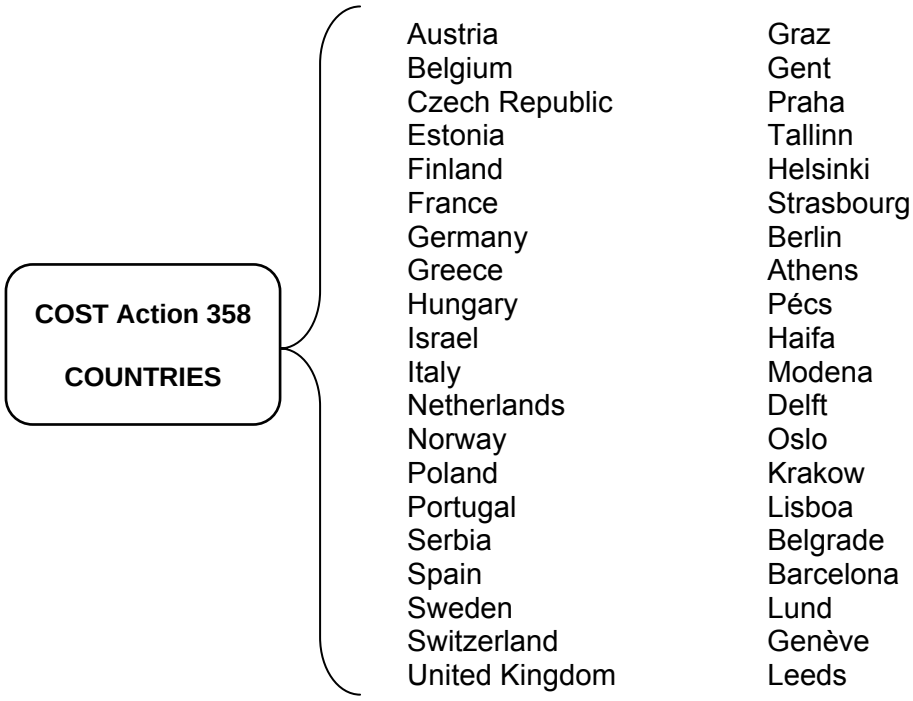
3. Application: 20 pedestrian-friendly cities

This section focuses on the comparison of twenty pedestrian-friendly cities, based on the qualitative framework and the PQN matrix tool presented in the previous section. Conditions for pedestrians vary widely from city to city: there are differences in the physical environment, the quality requirements and the implemented policy measures.

Although this approach is objectionable, since it is not a quantitative one, it gives an image of PQN measures in the European context of COST Action 358, providing a screening and a qualitative view of the issue, and offering useful information that can be consolidated by a further (quantitative) analysis.

3.1. The 20 cities

The analysis was extended to twenty case studies, i.e. twenty European pedestrian-friendly cities, one for each country participating in the COST Action 358. Selection of the cities was anticipated by a wide review of major European projects on pedestrian mobility and urban transport strategies (ADONIS; 1998; WALCYNG, 1999; CIVITAS, 2006). The following twenty cities were identified:



3.2. Objectives and methodology

Objectives

The general objective of the qualitative analysis follows the main objective of COST Action 358; that is, the strong will to provide a contribution to the knowledge in the frame of PQN and to assess the pedestrian environment within urban areas, stressing differences among the twenty countries involved in the Project.

The following are specific objectives of this analysis:

- to remark the importance of a qualitative approach;
- to illustrate the utility of the PQN matrix;
- to relate quality needs to structural and functional interventions in the pedestrian environment of twenty best case studies;
- to identify similarities and differences among European cities.

Methodology

The methodological aspects can be summarised in the following three steps:

1) Take stock of available data, information, research, current projects on the twenty cities.

2) Fill in the cells of the PQN accordingly to the previous step's results. The following legend is necessary to fill the matrix, since each colour represents the *number of cities that have implemented a certain measure (row) to accomplish a certain quality need (column)*.

	1 – 4 cities
	5 – 8 cities
	9 – 12 cities
	13 – 16 cities
	17 – 20 cities

3) Comment and interpret the PQN matrix, stressing similarities and differences among the cities and drawing conclusions on how they have implemented policy measures to assure a connected, convivial, comfortable, conspicuous and convenient pedestrian environment.

3.3. Main findings

This section presents the main results provided by the PQN matrix's analysis. The PQN matrix (Table 1) allows a comparison of cities (countries) drawing conclusions on how the they implemented physical measures to accomplish specific quality needs. Here, main remarks for the three layers of interventions are presented.

- Site interventions

As regards Crossings Interventions, several cities have implemented devices to improve the quality of crossings, and some of them have done remarkably well in this framework. Interventions are mainly directed at providing the crossing with adequate location, waiting and crossing time, information technology, capacity, as well as traffic calming measures (humps, roundabouts, curb extensions, raised crossings, intersection radii, rumble strips), dropped kerbs and ramps. Finally, adequate legibility and maintenance and cleanliness programmes are also necessary.

Particularly, six cities stand out for their achievements in this context: **Graz** (zebra crossings in transverse direction, rebuilt of crossings near PT waiting areas), **Praha** (special lights, coloured surfaces, new traffic lights, central islands, narrowing roads at zebra crossings, traffic-safety equipment), **Berlin** (LED traffic lights, touch sensitive buttons and audible signals, midblock refuge-islands), **Delft** (traffic lights, push buttons with audible feedback, traffic calming devices), **Lund** (islands and medians, audible information) and **Genève** (road islands, traffic light regulation, lowered kerbstones). Spain and the United Kingdom also improved pedestrians crossing sites through the installation of lowered kerbstones (**Barcelona**) and Pelican and Puffin crossings (**Leeds**). It can be noticed that traffic calming measures are strongly implemented in crossing sites, as it can be observed from the dark colour of the cells.

As regards Public Transport Waiting Areas Interventions (bus and tram stops, taxi ranks), they have also been implemented in the twenty case studies. Specific measures in these areas regard their location (not in curve), space (platform), equipment (shelters, seatings, benches) and the provision of ramps, dropped kerbs, lighting, etc.

Some cities that have implemented such measures are **Graz** (rebuilt of bus and tram stops, waiting shelters, curb stones), **Gent** (enlarging of platforms, new locations, equipment), **Barcelona** (platforms, dropped kerbs, cleanliness), **Praha** (platforms, ramps), **Helsinki** (platforms) and **Leeds** (bus docking, raised kerbs, high quality shelters, lighting). **Tallinn** and **Belgrade** also improved PT quality in recent times and site interventions were included in their City Planning. However, not all the cities have been improved Public Transport facilities in the last years and the (light) colour intensity of the cells reflects this observation.

- *Network interventions*

As regards Links Interventions, almost all cities have implemented devices to improve links' quality. Particularly, cities in Eastern European countries focused on this kind of interventions, that include (mainly) the provision of adequate footpaths (width, gradient, surface), street furniture, street lighting and information signage.
Examples can be found in **Belgrade** (footpaths width and surface, ramps, equipment, lighting), **Praha** (traffic-safety equipment), **Tallinn** (footpaths maintenance, buffer from cars and bicycles, reduction parking lots), **Athens** (footpaths width and maintenance, reduction of parking lots) and **Krakow** (re-paving of footpaths, ramps). All cities have planned and carried out the following kinds of intervention: footpaths surface and small piles (**Gent**), widening of footpaths and pavement edges lowered to road level (**Strasbourg**), concrete bollards and buffer between footpaths and roads (**Berlin**), widening of footpaths (**Barcelona**), footway maintenance and lighting (**Leeds**). The 4th row is the most intensely coloured, since the provision of dropped kerbs is one of the main objectives of almost all cities, whilst the other rows present lighter colours.

As regards Routes Interventions, all cities have also implemented devices to improve routes' quality. Interventions include the adequate location of fences, guardrails, parking lots, street furniture in order to prevent barriers and make pedestrians displacements more direct and convenient. Traffic calming measures (road narrowings, chicanes, half and full street closures /cul-de-sac, lateral shifts) are also included in this context, as well as the creation of an attractive walking environment (planting of trees, playing equipment, public art, fountains, statues, street cafes) and the provision of linking with PT, pedestrian bridges / overpasses / underpasses, lighting and signage.

Cities that have distinguished themselves in this context are **Graz** (strolling zones, street lighting), **Helsinki** (route and kerbs maintenance, the construction of overpasses and underpasses, Anti Graffiti Project), **Berlin** (traffic calming, speed limits, orientation maps), **Haifa** (new walkways), **Modena** (traffic calming, speed limits, pedestrian paths), **Delft** (new pedestrian paths, reduction of parking lots, traffic calming measures), **Oslo** (traffic calming, street lighting), **Lund** (reduction of parking spaces, traffic calming, lighting) and **Leeds** (speed restrictions, traffic calming). Finally, route maintenance and the creation of an attractive environment are strongly related to the renewal of the city planning and urban design and the cities that have best performed in this case are **Barcelona**, **Helsinki** and **Strasbourg**.

- *Space interventions*

As regards Public Spaces Interventions, all cities have implemented devices to improve the quality of rest areas, meeting places and squares. Measures include the adequate location of large complexes of buildings and gated areas, the provision of street furniture, lighting, green areas, parking measures. Programmes aimed at preserving historic centres and promoting tourism are also considered in this area, as well as maintenance programmes. Among the twenty study cases, both big and small cities have implemented measures directed at public spaces.

The cells with most intense colouring are those related to the provision of green areas and parking measures, and this could be explained by the urban design renewal that many cities have carried out in recent times. Particularly remarkable are the interventions carried out in the following cities: **Graz** (planting of green spaces). **Praha** (pedestrian precinct and maintenance of squares), **Tallinn** (re-surfacing squares, benches), **Helsinki** (caring for the vegetation, maintenance of fixtures, equipment and walking paths), **Strasbourg** (reorganisation of public squares, planting of trees, art works), **Berlin** (street trees, environmental zones), **Pécs** (rehabilitation of streets and squares), **Modena** (enlargement of green areas, benches, lighting, new playgrounds), **Delft** (playgrounds, planting areas, lampposts, street furniture), **Krakow** (repaving of squares), **Lisboa** (rehabilitation of squares and city gardens, street furniture), **Barcelona** (street furniture and lighting, planting trees, space for leisure) and **Genève** (new squares and playgrounds, fountains / monuments / statues, lighting).

As regards Special Zones Interventions, almost all cities have implemented devices to improve pedestrian environment in school and residential areas (mainly). Interventions include traffic calming measures in school zones, Home Zones and/or Car Free Zones planning, the implementation of speed limits, measures to prevent the transit of big heavy vehicles in central zones, parking measures and the provision of facilities in interchange zones. Pedestrianisation of the city centre has been planned in almost all twenty cases, as the intense colour of the cells suggests. Interventions in school zones are also largely implemented: **Graz** (school mobility management), **Gent** (speed limits, traffic calming, lighting), **Strasbourg** (crossings at school entrances, safety barriers), **Modena** (school mobility management, signage), **Delft** (traffic calming, walking programmes), **Genève** (mobility management, roundabouts, signage) and **Leeds** (Safe Routes to School). At the same time City Councils have focused on residential areas and the introduction of Home Zones or Zone 30 is widespread in several cities (particularly: **Graz**, **Gent**, **Delft**, **Oslo**, **Barcelona** and **Lund**). Pedestrian environment has improved through parking and heavy vehicles measures too, as it was demonstrated by the experience of different cities (look at the intense colour of the cells), such as **Graz**, **Praha**, **Helsinki**, **Athens** and **Lund**.

Table 1 PQN Matrix: application to 20 pedestrian-friendly cities

INTERVENTIONS		PQNs	CONNECTED			CONVIVIAL			CONSPICUOUS			COMFORTABLE			CONVENIENT		
			Undisturbed route	Absence of obstacles	Access to PT nodes	Absence of conflicts & assaults	Absence of rubbish, potholes,…	Adequate street furniture	Lighting and visibility	Delineation and legibility	Information & orientation	Adequate footpaths	Attractive landscape design	Absence of noise and fumes	Road crossing opportunities	Walkable distances	Absence of changing level and discomfort
SITE	CROSSINGS	Provide adequate location															
		Provide adequate signalised cr.															
		Provide adequate capacity															
		Provide traffic calming measures															
		Provide dropped kerbs, ramps,…															
		Prevent car parking and obstacles															
		Provide adequate legibility															
		Provide maintenance, cleanliness															
	PUBLIC TRANSPORT WAITING AREEAS	Provide adequate location															
		Provide adequate space															
		Provide adequate equipment															
		Provide protections from traffic															
		Provide dropped kerbs, ramps															
		Reduce gaps with PT access p.															
		Provide adequate lighting															
		Provide maintenance, cleanliness															
NETWORK	LINKS	Provide adequate footpaths															
		Provide adequate furniture location															
		Reduce kerb parking															
		Provide dropped kerbs, driveway															
		Provide adequate traffic-buffer															
		Provide information and orientation															
		Provide adequate lighting															
		Provide maintenance, cleanliness															
	ROUTES	Prevent barriers															
		Provide traffic calming measures															
		Create an attractive environment															
		Provide adequate linking with PT															
		Provide pedestrian bridges,…															
		Provide orientation signage															
		Provide adequate lighting															
		Provide maintenance, cleanliness															
SPACE	PUBLIC SPACES	Prevent barriers															
		Provide street furniture, lighting															
		Provide information / orientation															
		Provide parking measures															
		Provide green areas															
		Reduce noise and emissions levels															
		Preserve historic centres															
		Provide maintenance, cleanliness															
	SPECIAL ZONES	Provide TC in school zones															
		Plan Home zones (30 km/h)															
		Plan Car free zones															
		Adopt speed limits															
		Prevent big heavy vehicles' transit															
		Plan a pedestrianisation															
		Establish Road/Park Princing m.															
		Provide facilities in interchange z.															

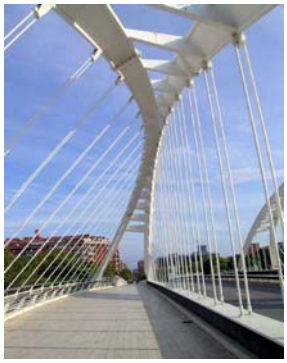
Source: own elaboration

Furthermore, the following general considerations can be pointed out:

a) Looking at the distribution of the coloured cells in the matrix, it is clear that there are areas with different concentrations and some voids (white cells) too. It can be noticed that interventions must be apt to warrant the 5Cs not one by one, but simultaneously. In practice, interventions are interrelated to the 5Cs, i.e. pedestrians' quality needs, through a non-biunivocal correspondence: some PQNs can be achieved with different interventions and interventions can bring about different PQNs. For example, *connectivity* is mainly related to the network level, while *conveniency* is not primarily affected by space interventions. *Conviviality* and *comfort* are more related to space interventions indeed, while *conspicuity* presents a quite homogeneous distribution among the three interventions layers.

b) The PQN matrix does not illustrate the role of the context issue within the analysis; nevertheless, the influence of the physical context is enormous, since it is the key to explaining the colour's intensity of the cells, that means the similarities and differences among the cities. In Table 2 five examples are presented, that provide evidence for the connection among context, quality needs and measures within the pedestrian system.

Table 2 Connection among context items, pedestrian needs and interventions

Cities	Context item	Physical measures	Example photo
Gent Tallinn Helsinki Oslo Lund	Climate conditions	Maintenance of footways is important to avoid stumbling and falling accidents in countries with a snowy and icy climate. Moreover, Public Transport equipment includes shelter and special weather protection in Nordic cities. These measures relate to the quality need of **comfort**.	 *(Helsinki – FI)*
Graz Gent Praha Strasbourg Berlin Delft Barcelona Genève Leeds	Presence of barriers	Footbridges and underpassess to avoid detours and provide direct walkways are related to the presence of rivers or channels, that are natural barriers within pedestrian spatial environment. These measures relate to the quality need of **connectivity**.	 *(Barcelona – ES)*
Praha Berlin Strasbourg Athens Barcelona	Architectonical and historical buildings	In touristic cities priority measures have been pedestrianisation of the city centre and rehabilitation of squares and green areas, as well as the provision of street furniture, to create a safe and pleasant place where to walk. These measures relate to the quality need of **conviviality**.	 *(Praha – CZ)*

Haifa Athens Lisboa	Topography	Pedestrians aim at following the shortest and most direct path to their destination. For example, pedestrian stairways can make a big difference in hilly terrain or cities with a unique topography and local altitude differences. These measures relate to the quality need of **convenience**.	 *(Haifa – IL)*
Strasbourg Berlin Barcelona Helsinki Genève	Distribution of activities	The provision of information regarding shops, schools, banks, hospitals and, above all, the financial district is necessary in medium and big-sized cities where the distribution of activities is extended and sometimes dishomogeneous. These measures relate to the quality need of **conspicuity**.	 *(Leeds – UK)*

Source: own work

c) The PQN matrix and the qualitative framework within the STSM have focused on the "spatial environment" slice of the Pizza Model, as it was emphasised throughout the article. However, (physical) interventions and measures are also related to the other three dimensions of the model and the following three examples best help to understand this observation:

- PM slice: *person* — City with high natality rate and many children (e.g.: Delft): implementation of traffic calming schemes around school zones and mobility management for home-school based trips.
- PM slice: *vehicle* — City with a car-oriented mentality and an old vehicle fleet (e.g.: Athens): implementation of pedestrianisation and parking policy to reduce car use and improve walking.
- PM slice: *organisation* — City with a weak transport policy and regulatory development (e.g.: Krakow): implementation of traffic calming measures and speed limits.

4. Conclusion

What stands out from this article is the importance of developing a framework to assess pedestrian environment, from both a qualitative and quantitative perspective. Although a qualitative analysis runs the risk of being perceived as less useful than a quantitative one, it provides relevant information if it is based on a framework developed from literature studies and experience within pedestrian issue.

Particularly, two main remarks follow from this work:

1) Three items should be considered when assessing the pedestrian environment: context, quality needs and interventions on the physical space. As regards pedestrian quality needs,

they are translated in the “5C layout”: connectivity, conviviality, conspicuity, comfort and convenience.
The PQN matrix, based on the qualitative framework, is a picture checklist that connects quality needs and physical measures, with the objective of assessing pedestrian environment.
The qualitative approach has only considered the “spatial environment” of the Pizza Model and it would be interesting to expand the assessment framework to the other three dimension of the pedestrian system: person, vehicle and organisation.

2) The application to the twenty pedestrian-friendly cities aims at providing useful information on the current PQN measures and quality needs, evaluating the European condition from a general approach.
From the PQN matrix analysis, it can be noticed that interventions must be apt to warrant the 5Cs not one by one, but simultaneously.
Although context items are not included in the PQN matrix, they are the key factors in explaining similarities and differences among cities (countries). Particularly, “space interventions” are implemented in almost all cities, while more differences can be observed in the other dimensions (site and network), due to differences in the physical context of the case studies (e.g.: the presence of a river, the size of the city, the geography of the area, the climate conditions, etc).

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